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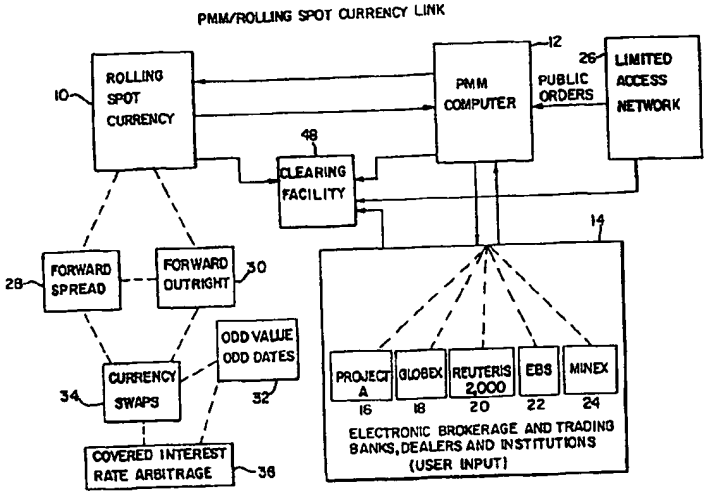

(57) Abstract

A system and method is provided for linking a Rolling Spot Currency contract (i.e. futures contracts in the foreign exchange market) with a Principal Market Maker (i.e. quoter) specialist program designed to replicate an over-the-counter bank trading environment by merging a combined trader and broker, with a traditional futures pit trading environment. The link includes a Principal Market Maker (PMM) computer (12), a computer (10) coupled to computer (12) for trading rolling spot currency, a conventional electronic brokerage and trading network (14) such as the REUTERS trading system, a limited access network (26) used by non-professional traders, and a clearing facility (48), which is coupled to PMM computer (12), computer (10), network (14) and limited access network (26) to confirm and settle trades executed by PMM computer (12). These elements of the link are coupled to PMM computer (12) to receive and transmits bids and offers for international currency trading.

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System and Method for Trading Having a Principal Market Maker

Field of the Invention

The invention relates to an electronic trade exchange system and in particular to the merger of a specialist system charged with the responsibility of making a sized (designated large quantity), two-sided bid/offer market in a traditional pit trading environment.

Background of the Invention

There are many different types of exchanges in existence, such as the New York Stock Exchange (NYSE) and the Chicago Board of Trade (CBOT). Generally these exchanges provide an open market for the purchase and sale of securities and commodities. Principle or designated market makers can be employed at these exchanges to maintain a market in securities and commodities. The market maker maintains a market by being on the opposite side of every trade.

The use of a human market maker in a trading environment is known. For example, the use of a market maker has been employed in connection with trading securities. Rules pertaining to the use of a Principal Market Maker (PMM) in futures markets have also been proposed by the Chicago Mercantile Exchange (CME) to allow the use of a market maker in a commodities environment. However, these rules have not been implemented. The CME's proposed rules for its Principal Market Maker (PMM) are similar to rules written by the Chicago Board of Options Exchange (CBOE), although adapted for exchange traded futures.

The PMM's functions are similar to that of a market making foreign exchange bank and broker specialist. A PMM specialist should continuously maintain a sized two-sided bid/offer market for its designated products. This market should be of a designated minimum quantity and maximum spread, i.e., the difference between bid and offer. Also, the PMM should maintain the "public order book" (collection of public customer orders to purchase or sell) with respect to the assigned products. Finally, the PMM should give priority to customer order execution over personal trading.

As compensation for the above functions, the PMM is typically

entitled to participatory volume defined as the average daily pit traded volume for the preceding calendar quarter. For example, the PMM may be entitled to 40% of volume at the bid/offer price if volume is between zero and 2,500; and 35% of volume at the bid/offer price if volume is between 2,501 and 5,000. No entitlements are currently offered if volume exceeds 5,000 transactions per day. Additionally, the PMM is entitled to the retention of floor executed brokerage transactions commissions except where principal-agency conflicts of interest apply, or other arrangements have been made.

The foreign exchange spot cash market facilitates the exchange of currency between two parties. The actual currency transfer generally occurs two business days following the transaction date. At the close of business of each trading day, market participants roll or swap their open spot positions forward one business day. This enables the next trading day's position to be maintained in spot terms. Eventually, future spot positions are netted against existing positions.

The CME's Rolling Spot Currency contract parallels the quoted spot or cash market with a few notable exceptions: (1) the exchange makes an automatic daily adjustment for the "roll" via a cash debit/credit; (2) because the trades go through the CME Clearing House, many problems associated with interbank spot transactions are eliminated; and (3) all Rolling Spot Currency contracts currently have a standard size. Thus, the CME's Rolling Spot Currency contracts combine the price convention of the interbank market with all the benefits of the CME and its existing central clearing facility. Traders do not have to pay away bid/ask spreads on daily spot rolls because the CME's roll process, called the "Daily Adjustment," is performed automatically. The need for a credit-worthiness counterparty check is eliminated because the counter-party is always the CME Clearing House. Overdraft expenses are eliminated using Rolling Spot Currency contracts because there is no need to actually make a payment or accept a delivery as in the foreign exchange (forex) markets.

Unlike regular spot transactions in the foreign exchange markets, Rolling Spot Currency trades do not tie up bank credit lines. Therefore, institutional traders can conserve their firm's credit lines for other uses. Because Rolling Spot Currencies are a centralized exchange traded contract, these contracts allow all traders to obtain the same quotes regardless of their firm's credit rating or size. Quick access to cash flows can also be created by

combining the CME's Rolling Spot Currencies with currency forwards to produce forward swap positions. In addition to freeing up credit lines, Rolling Spot Currency positions are not affected by the Bank for International Settlements' Capital Adequacy Requirement Standards.

By circumventing the tasks of funds transfer and multiple ticket writing to facilitate the roll, the CME replicates the one-day roll with a simple line entry and no deliveries. Furthermore, multiple trades transacted in the inter-bank market with several counterparties require separate ticketing for each buy and sell. The CME's Average Price System (APS) allows multiple Rolling Spot trades transacted throughout the day to be assigned an average price. The APS significantly reduces costly paperwork because the trader has the benefit of averaging all trades into single buy and sell tickets.

Previous attempts at providing an active interbank exchange traded currency market have failed. One reason that previous attempts have failed is because futures markets do not presently require nor provide the proper incentives to any trader or entity to deliver the service of a current 24-hour bid/offer and large quantity market. Failure of prior attempts to develop an interbank exchange traded currency has kept the transaction cost (the difference between bid and offer) of market participation in worldwide international currency trade very high because liquidity of the exchange traded futures market is relatively low vis-a-vis the interbank over-the-counter forex market.

Futures exchange traded foreign currency trading has failed to compete with the over-the-counter-forex market. The CME's foreign currency volume has recently declined, while over-the-counter volume increased. In addition, a "second tier" of currency trading banks have recently entered the "top twenty" group of currency traders. This suggests that market growth in foreign currency trading is dynamic, not static, and represents another failure of the current methodology of exchange traded foreign currencies.

Prior attempts have also been made by exchanges to capture market share in the area of currency trading which is established between the spot (current date transaction) and the short duration (1-14 days) of currency market derivative products. Foreign exchange average daily volume may be as high as 893 billion dollars. Two thirds of this figure may also represent forward and swap derivative transactions. These transactions represent an important untapped market for exchange traded currency products.

Another area in which exchange traded currencies have failed to compete is the area called Exchange For Physical (EFP). This area is currently a fast growing, off-exchange trade between Futures Clearing Merchants (FCM), which are analogous to brokerage houses in the securities industry. Because of the failure to provide a market maker with long term growth incentives to position itself in the market 24-hours per day, and to market and make the essential business contacts to promote its service and the exchange's products, exchange traded currencies are losing business to the EFPs. Furthermore, the EFP is another area of over-the-counter, unregulated currency trading which is developing to the detriment of world financial stability.

The greatest failure of the over-the-counter forex currency market is its inability to transfer risk in a timely, cost effective manner. The possibility of failure of one or more large currency market making banks is great because no present arena provides the vital service of efficient, cost effective risk transfer.

Prior attempts at capturing flexibility in establishing new innovative currency contracts and direct marketing contacts with currency trading personnel have failed on the major futures exchanges. This failure to innovate and communicate is also exposing the world to potential currency risk because exchanges cannot provide the necessary products to limit risk. By establishing a mechanism associated with an exchange responsible for making a market at all times and charged with the responsibility of marketing that presence, the futures exchanges will be able to provide a much needed service similar to a bank, but with all the inherent advantages of cost competitiveness and regulatory safety of an exchange.

Summary of the Invention

The present invention provides a method and system for linking Rolling Spot Currency contracts with a PMM specialist program. The Rolling Spot Currency contracts are futures contracts which in almost all aspects replicate spot currencies in the forex market. The PMM specialist program is designed to replicate an over-the-counter bank trading environment by merging the best aspects of a specialist system—a combined trader and broker, charged with the responsibility of making a sized two-sided, bid/offer market—with a traditional futures pit trading environment.

In a first aspect of the present invention, the system includes an

electronic brokerage and trading network having at least one computer coupled to receive and transmit bids and offers for international currency trading; a display terminal and input; and a PMM computer coupled to the electronic brokerage and trading network wherein the PMM computer is operative to receive and transmit the bids and offers and execute international currency trades by maintaining a bid and offer market for such currencies.

In a second aspect of the present invention, the system includes means for receiving a primary currency purchase order indicative of whether a currency is to be bought or sold; means for receiving a secondary currency purchase order indicative of a currency option hedge; a PMM futures computer coupled to the means for receiving the primary currency purchase order and operative to execute primary currency purchase orders and maintain a currency futures market; a PMM options computer coupled to the means for receiving the secondary currency purchase order and operative to execute secondary currency purchase orders and maintain a currency options bid and offer market; and a bi-directional communications link coupled between the futures and options computers to facilitate intermarket trading to manage risk taken in a position resulting from a trade in either market.

In a third aspect of the present invention, the system includes a communications interface operative to transmit currency bids and offers from at least one financial institution; and a PMM computer coupled to the communications interface and operative to receive the currency bids and offers and execute trades to maintain a market for international currency trades.

In a fourth aspect of the present invention, the system includes an electronic brokerage and trading network having at least one computer, display terminal and input coupled to receive and transmit bids and offers; and a principal market maker computer coupled to the electronic brokerage and trading network to receive and transmit the bids and offers and execute trades by maintaining a constant bid and offer market.

A fifth aspect of the present invention involves a method of trading currencies including the steps of receiving and transiting bids and offers for publicly traded currencies; storing the received bids and offers in a memory; identifying matching bids and offers; executing the matching bids and offers; identifying unmatched bids and offers; and providing a complementary trade to maintain a market for such currencies.

A sixth aspect of the present invention involves a method of maintaining a market for publicly traded currencies including the steps of receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold; receiving a secondary currency purchase order, the secondary currency purchase order indicative of a currency option hedge; matching and executing the primary currency purchase order to maintain a currency futures market; matching and executing the secondary currency purchase order to maintain a currency options market; and providing intermarket futures and options trading to manage risk taken in a position resulting from a trade in either market.

A seventh aspect of the present invention involves a method of trading currencies including the steps of receiving currency bids and offers from at least one financial institution; storing the currency bids and offers in a memory; matching the stored bids and offers to maintain a market for the currency traded; and executing the matched trades.

An eighth aspect of the present invention involves a method of trading including the steps of receiving and transmitting bids and offers; storing the received bids and offers in a memory; identifying matching bids and offers; executing the matching bids and offers; identifying unmatched bids and offers; and providing a complementary trade to maintain a market.

Some of the benefits to be expected from the merger of the PMM specialist and Rolling Spot Currency contracts include, but are not limited to: (1) increased volume and open interest in both currency futures and currency options and, therefore, a reduction in currency transaction costs; (2) greater ability to utilize modern risk transfer techniques to reduce risk and increase person-to-person servicing and marketing in the foreign exchange market; (3) a more stable financial environment because of exchange dictated clearing considerations and regulations; and (4) the convenience of a 24-hour electronic futures market place for all currency traders and financial institutions worldwide.

The invention itself, together with further objects and attendant advantages, will be understood by reference to the following detailed description, taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

Figure 1 is a block diagram of one presently preferred embodiment of the PMM /Rolling Spot Currency system of the present invention.

Figure 2 is a block diagram of a more detailed illustration of the PMM/Rolling Spot Currency link of the system shown in Figure 1.

Figure 3 is a block diagram of the PMM/Rolling Spot Currency Link of the present invention which illustrates trading using the electronic brokerage and trading network shown Figure 1.

Figure 4 is a flow chart of the processing that occurs inside the PMM/Rolling Spot Future computer.

Figure 5 is a flow chart of the processing that occurs inside the PMM/Rolling Spot Option computer.

Figure 6 is a graphical representation of the PMM/Rolling Spot Link electronic market order routing system of the present invention.

Figure 7 is a presently preferred embodiment of an Automated Brokerage Screen for use with the PMM/Rolling Spot Link Futures Workstation of the system of the present invention.

Figure 8 is a presently preferred embodiment of a Trading and Risk Management Screen for use with the PMM/Rolling Spot Link Futures Workstation of the system of the present invention.

Figure 9 is a presently preferred embodiment of a Trading and Risk Management Screen for use with the PMM/Rolling Spot Link Options Workstation of the system of the present invention.

Figure 10 is a presently preferred embodiment of an Automated Brokerage Screen for use with the PMM/Rolling Spot Link Options Workstation of the system of the present invention.

Detailed Description of the Presently Preferred Embodiments

Figure 1 is a block diagram of one presently preferred embodiment of the PMM/Rolling Spot Currency system of the present invention. Preferably, the link includes PMM computer 12; a computer 10 coupled to the PMM computer 12 for trading rolling spot currency; an electronic brokerage and trading network 14 including a plurality of electronic trading systems 16, 18, 20, 22, 24 for use primarily by professional traders such as banks, dealers and institutions; a limited access network 26 primarily for use by non-professional

traders such as individuals; and a clearing facility 48 coupled to the PMM computer 12, the computer 10, the electronic brokerage and trading network 14 and the limited access network 26 to confirm and settle trades executed by the PMM computer 12. The PMM computer 12 handles the purchase and sale of currencies and is constantly charged with maintaining a currency market, i.e., sized bid/offer market. Preferably, as those skilled in the art would appreciate, computers 10 and 12 should be able to accommodate a large amount of transactions in a timely manner. The electronic trading systems 16, 18, 20, 22, 24 are well known in the art and need not be discussed in further detail herein. These systems are coupled to the PMM computer 12 to receive and transmit bids and offers for international currency trading. The PMM/Rolling Spot Currency link of the present invention facilitates numerous types of derivative currency trades. Preferably, these trades include forward spread 33, forward outright 35, currency swap 34, odd value and odd date 32, and covered interest rate arbitrage 36.

The ability to transfer risk automatically and instantaneously through electronic and/or verbal communications from the PMM to various other individual traders, or other entities, is a unique PMM/Rolling Spot Currency Link feature. Unlike banks, whose only method of transferring risk is to make markets which, in many instances, contain sufficiently wide spreads (the difference between the bid and the offer) in order to minimize bank risk at customer expense, the PMM/Rolling Spot Link allows for risk minimization at the same time that it reduces the size of the spread between bid and offer.

Figure 2 is a block diagram of a more detailed illustration of the PMM/Rolling Spot Currency link of the system shown in Figure 1. In particular, Figure 2 illustrates the manner in which a PMM/Rolling Spot Futures computer 33 can transfer risk associated with trades to a PMM/Rolling Spot Options computer 35. This process is called primary risk transfer. Primary risk transfer can be accomplished through the use of communications, preferably electronic communications, between a PMM/Rolling Spot Futures computer 33 and a PMM/Rolling Spot Options computer 35. Such communications preferably include wireless, telephone, touch and voice activation computer. Primary risk transfer involves inventory hedge (defense) through the use of call option (the right to buy the underlying) purchase or sale and put option (the right to sell the underlying) purchase or sale. The purchase of a call option allows upside

potential investment increase when a market rises, while the sale of a call option allows limited downside investment increase when the market decreases. On the other hand, the purchase of a put option allows potential upside investment increase when a market declines, while the sale of a put option allows limited upside investment increase when a market rises.

Referring to Figure 2, an example of the process just described is illustrated as follows. The PMM/Rolling Spot Futures computer 33 receives a primary bank order to purchase or sell currency. The PMM/Rolling Spot Futures computer 33 promptly counters the risk associated with the futures purchase or sale by the purchase of a reciprocal amount of options from the PMM/Rolling Spot Options computer 35, thereby producing a synthetic short sale. This action neutralizes the PMM's inventory risk. Therefore, the original inventory action has been canceled. The PMM/Rolling Spot Currency Options computer 35 transfers risk by making the appropriate transactions within the options trading crowd through terminals 32, 34, 36. These transactions disperse the risk among a multitude of traders. As shown in Figure 2, the risk can be dispersed horizontally through time spreads, vertically through volatility spreads or a combination of horizontal and vertical spreads, known as "combos" or "straddles".

Secondary risk transfer is distinguished from primary risk transfer in that a bank or other institution does not wish to purchase the underlying currency prior to entering into an options transaction. This secondary process is accomplished as follows. The PMM/Rolling Spot Options computer 35 receives a secondary bank order for an option hedge. The PMM/Rolling Spot Options computer 35 promptly transfers this risk by the purchase or sale of the appropriate amount of futures. The PMM/Rolling Spot Futures computer 33 transfers risk by making the appropriate transactions within the PMM/Rolling Spot Futures Traders 38 and the Currency Futures Traders 40.

A typical example of a primary risk transfer transaction is illustrated as follows. First, the PMM/Rolling Spot Futures computer receives an inventory order of 100 Rolling Spot Currency futures at a hypothetical Deutschmark price of $.6500 (DM 1.5385), basis December, which it must purchase. The PMM/Rolling Spot Futures computer promptly transfers this risk by the purchase of the same amount of December $.6500 (DM1.5385), put options (the right to sell) and the sale of the same amount of December $.6500 (DM 1.5385),call options (the right to buy) producing a synthetic short sale. This action

neutralizes the PMM's inventory risk. Therefore, the original inventory action has been canceled. The PMM/Rolling Spot Options computer transfers risk by making the appropriate transactions within the options trading pit crowd, thereby laying off that risk and dispersing the risk among the multitude.

A typical secondary risk transfer is illustrated as follows. Assume that a bank has previous ownership of 100 Rolling Spot Currency futures and now needs to hedge its own inventory. The bank may purchase the same amount of December $.6500 (DM 1.5385), put options and sell the same amount of December $.6500 (DM 1.5385), call options, again producing a synthetic short sale. The bank has now transferred or neutralized its risk. The PMM/Rolling Spot Options computer will be able to transfer the risk which it just assumed in the following manner. The first transfer mode would be the inverse of the primary risk transfer. For instance, if the PMM/Rolling Spot Options computer inventories 100 December $.6500 (DM 1.5385), calls, it may sell 100 December $.6500 (DM 1.5385), put options and the corresponding amount of Rolling Spot Currency futures from the PMM/Rolling Spot Futures computer. This will neutralize the PMM/Rolling Spot Options computer risk.

A second mode of risk transfer for the PMM/Rolling Spot Options computer is transfer of risk into the options pit trading crowd. At this point, the risk can be dispersed horizontally through time spreads, vertically through volatility spreads or a combination of horizontal and vertical spreads. The ultimate product of its risk transfer product is always the same—enabling the PMM to make 24-hour markets in a risk minimum exchange traded environment—something never before accomplished.

Unique to creating an exchange traded forex market by linking the PMM and Rolling Spot Currencies, is the ability to offer a reliable electronic 24-hour exchange(s) traded market with current bid/offer, offer quotes and size. With this exchange traded market maker function, a 24-hour exchange electronic traded banking market—a forex bank and institutional trading market—is now possible. This electronic traded banking market can be accomplished by forming an exchange of non-equity owning banks and other qualified financial institutions which would have electronic linkage to the exchange traded forex markets of the rolling spot and other derivative currencies. These non-equity members preferably would have the ability to execute their transactions at member exchange rates, electronically as any other

member of the exchange(s) would have. The major difference between the electronic market and full exchange privilege would be that electronic market participants would only have the electronic ability to access the exchange trading PMM computer directly and not have physical access to the exchange trading floor. This does not present an obstacle because most banks do not want the cost or responsibility of accessing the exchange floor directly. They simply would like the opportunity to trade competitively and at a very low cost.

Figure 3 is a block diagram of the PMM /Rolling Spot Currency Link of the present invention which illustrates trading using the electronic brokerage and trading network 14 shown in Figure 1. The electronic brokerage and trading network 14 allows remote terminal trading between financial institutions. Preferably, a remote terminal 42 located at a financial institution receives customer orders and queues them by time received and price. These requests remain in the system until matched or withdrawn. The remote terminal 42 accesses PMM computer 44, preferably via modem, to obtain required bid, offer and quantity markets information. The PMM 44 displays last trades and quantity on its screen for information purposes of computing risk transfer information. The financial institution, via remote terminal 42, can match the bid or offer based on stored customer requests. If a trade is completed to the PMM inventory, the PMM computer 44 will automatically transfer the risk assumed in the trade by transmitting to the PMM Options computer 46 a request to purchase the same amount of put options or sell the same amount of call options, thereby producing a synthetic short sale as described above. A clearing firm 48 receives confirmation of the trade after its screen (not shown) displays printed transaction record and customer accounts are settled. Finally, a clearing system 50 matches and settles the trades.

Figures 4 and 5 are flow charts of the processing that occurs inside the PMM/Rolling Spot Futures computer 33 and PMM/Rolling Spot Options computer 35, respectively. In Figure 4, a host routing routine 41 sends orders to the PMM computer 33 in order of time of receipt. The PMM computer 33 then decides whether a trade will be executed. If a trade will not be executed, the PMM computer 33 queues the bid or offer in order of time of receipt and price and updates the video display to reflect the bid or offer. If a trade will be executed, depending on whether the order is a bid or an offer, the PMM computer 33 adds or subtracts the corresponding currency from the PMM

inventory, updates the video display accordingly and transmits to the PMM/Rolling Spot Options computer 35 to transfer the risk associated with the trade.

In Figure 5, the PMM/Rolling Spot Options computer 35 receives a transmission from the PMM/Rolling Spot Futures computer 33. The PMM computer 35 decides whether a trade will be executed. If a trade will not be executed, the PMM computer 35 queues the bid or offer in order of time of receipt and price and updates the video display to reflect the bid or offer. If a trade will be executed, depending on whether the order is a bid or an offer, the PMM computer 35 adds or subtracts from the PMM inventory of relevant currencies and updates the video display accordingly. The PMM/Rolling Spot Options computer 35 transfers the risk associated with the trade by making the appropriate transactions within the options trading crowd through terminals 32, 34, 36.

Figures 6-8 provide implementation views of the PMM/Rolling Spot Link Workstation functions of the present invention. Figure 6 shows a preferred embodiment of the PMM/Rolling Spot Link electronic market order routing system. In Figure 6, the best inside markets 54, 56, 58, 60, 62 (highest bid and lowest offer) from the various electronic trading systems 16, 18, 20, 22 and 24 of Figure 1 are communicated into the display field of screen one 52. This information is stored by the PMM/Rolling Spot Link Workstation to produce the best overall inside market 64. This information is also transferred to the PMM/Rolling Spot Link Automated Brokerage Screen as shown in Figure 7.

In the current example, only one customer order is featured because all other customer orders are away from the market (above and below the market). The featured market is a sale of 35 March Deutschmark Rolling Spot at a price of DM 1.5385, ($.6500). The screen 68 shown in Figure 7 features a touch activated order fill device 70 which automatically divides the quantity of the trade among participating traders.

Figure 8 shows a preferred embodiment of the PMM/Rolling Spot Link Workstation Trading and Risk Management Screen 72. In the current example, the PMM computer has assumed the responsibility to make liquid markets by increasing the bid. The original bid was DM 1.5384, ($.6500) as displayed in the PMM Market Quote Screen 74. However, the PMM computer took the customer order one pip (one unit of currency movement) higher to

facilitate the trade. Because there was also local participation at the same price, the PMM computer received its mandated allowance for this trade of between 30% and 40% in accordance with the CME's proposed rules as previously described herein.

The Inventory (Change) Screen 76 and Inventory Delta Screen 78 allow the inventory position and risk to be known at all times. The Inventory (Change) screen 76 can be altered preferably by the use of a pointing device and keyboard. The Inventory Delta Screen 78 has a color graphic feature which enables the PMM computer to quickly understand the inventory risk position.

The PMM Risk Transfer Screen 80 is connected to the most commonly used floor brokers in the "options crowd" for PMM risk transfer at rapid rates. In the current example, the PMM wishes to execute a "Conversion" (perfect hedge) to eliminate market risk and take advantage of time premium decay. (The amount an option would command if it were exercised immediately is termed its intrinsic value. However, options always trade above intrinsic value until the time of exercise at which time the option will trade at only its intrinsic value. The difference between the value of the option above intrinsic value and that value at exercise is known as time decay.) The trade is initiated preferably using a pointing device and keyboard. This sets the amount of the specific product to purchase or sell. The trade button 82 is activated and the trade request is set to the PMM/Rolling Spot Options Workstation for execution. This action minimizes the PMM computer's risk, heretofore, unavailable to any interbank trader.

Figures 9 and 10 show preferred embodiments of the PMM/Rolling Spot Link Options Workstation Trading and Risk Management Screen and the Automated Brokerage Screen, respectively. These screens are similar to the screens discussed above with the exception that they convey options information and are used for the options PMM computer rather than the futures PMM computer.

The PMM/Rolling Spot Link of the present invention provides several advantages. The link provides exchange floor traders, brokers and customers with an ongoing market for trade layoff, both profitable and otherwise. Traders, either in futures and options via a spread, or in the Rolling Spot, will be able to stop unprofitable positions based on the knowledge that a sized bid at or below, or sized offer at or above, their trade exists. This element of the

PMM/Rolling Spot Link will increase trader willingness to increase trading activity—trade and take larger positions—even during market cycles when currency volatility may be high.

Increased "floor trader activity" will encourage growing volume and open interest in currency futures. It will also increase the open interest distribution in the currency products. Unlike other successful futures products, currency products do not produce significant open interest beyond the first expiration month. Many forex market transactions are now occurring at durations of less than fourteen days. A PMM/Rolling Spot Currency Link will exploit this vast marketing terrain where present products do not and provide a needed public service. Since significant forex activity takes place between the current date and the first fourteen days, exchange open interest will accumulate in this area and give exchange traded currency products a wider subsequent participation and that participation will reduce transaction costs of all currency trades.

A unique feature of the PMM/Rolling Spot Currency Link is the ability to have a heretofore over-the-counter unregulated trading concept, regulated within the rules of an exchange(s) and the various domestic regulatory agencies governing those exchanges, such as the Securities and Exchange Commission and the Commodities Futures Trading Commission. This is a powerful concept because regulation will add safety to the world currency markets. It is to the advantage of the world currency trading community, both cost-wise and time-wise, to utilize the existing exchange regulatory framework rather than create a new set of regulations in the over-the-counter forex market.

Also, unique to this invention, is its ability to mandate that the Principal Market Maker maintain business contacts throughout the trading community. This direct marketing approach by a recognizable market maker who is required to provide constant 24-hour international currency trading, is in direct contrast to the generally accepted exchange(s) practices of passive exchange generated marketing and will provide the trading community with much needed exchange contacts.

As those skilled in the art will appreciate, the system described herein should accommodate a plurality of markets such as, for example, interest rate, agricultural commodities, etc. The system should also accommodate a plurality of information vendors such as Dow-Jones Telerate. Thus, it is to be

understood that the foregoing detailed description is illustrative rather than limiting and it is the following claims, including all equivalents, which are intended to define the scope of the invention.

WHAT IS CLAIMED IS:

1. A system for trading currencies, comprising:

an electronic brokerage and trading network having at least one computer, display terminal and input, the electronic brokerage and trading network coupled to receive and transmit bids and offers for trading currency; and

a principal market maker computer coupled to the electronic brokerage and trading network, the principal market maker computer operative to receive and transmit the bids and offers and execute currency trades by maintaining a bid and offer market for such currencies.

2. The system defined in claim 1, further comprising a clearing facility for processing currency trades executed by the principal market maker computer.

3. The system defined in claim 1, further comprising means for allowing forward spread trades.

4. The system defined in claim 1, further comprising means for allowing forward outright trades.

5. The system defined in claim 1, further comprising means for allowing currency swaps.

6. The system defined in claim 1, further comprising means for allowing odd value and odd date trades.

7. The system defined in claim 1, further comprising means for allowing covered interest rate arbitrage.

8. The system defined in claim 1, wherein the network includes a Project A trading system.

9. The system defined in claim 1, wherein the network includes a Globex trading system.

10. The system defined in claim 1, wherein the network includes a Rueters 2000 trading system.

11. The system defined in claim 1, wherein the network includes an EBS trading system.

12. The system defined in claim 1, wherein the network includes a Minex trading system.

13. The system defined in claim 1, wherein spot and all derived currencies can be traded over the system.

14. A principal market maker/rolling spot link for trading currencies, comprising:

means for receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

means for receiving a secondary currency purchase order, the secondary currency purchase order indicative of a currency option hedge;

a principal market maker futures computer coupled to the means for receiving the primary currency purchase order, the principal market maker futures computer operative to execute primary currency purchase orders and maintain a currency futures bid and offer market;

a principal market maker options computer coupled to the means for receiving the secondary currency purchase order, the principal market maker options computer operative to execute secondary currency purchase orders and maintain a currency options bid and offer market; and

a bi-directional communications link coupled between the futures and options computers, the bi-directional communications link to facilitate intermarket trading to manage risk taken in a position resulting from a trade in either market.

15. The link defined in claim 14, further comprising a communications link to rolling spot future trade systems.

16. The link defined in claim 14, further comprising a communications link to currency futures trade systems.

17. The link defined in claim 14, further comprising a communications link to allow vertical, horizontal and combination spread options trading.

18. The link defined in claim 14, wherein the bi-directional communications link comprises a wireless communication system.

19. The link defined in claim 14, wherein the bi-directional communications link comprises a telephone.

20. The link defined in claim 14, wherein the bi-directional communications link comprises a touch activation computer.

21. The link defined in claim 14, wherein the bi-directional communications link comprises a voice activation computer.

22. A principal market maker/rolling spot link for trading currencies, comprising:

means for receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

means for receiving a secondary currency purchase order, the secondary currency purchase order indicative of an outright option purchase;

a principal market maker futures computer coupled to the means for receiving the primary currency purchase order, the principal market maker futures computer operative to execute primary currency purchase orders and maintain a currency futures bid and offer market;

a principal market maker options computer coupled to the means for receiving the secondary currency purchase order, the principal market maker options computer operative to execute secondary currency purchase orders and maintain a currency options bid and offer market; and

a bi-directional communications link coupled between the futures and options computers, the bi-directional communications link to facilitate intermarket trading to manage risk taken in a position resulting from a trade in either market.

23. A principal market maker/rolling spot link for trading currencies, comprising:

means for receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

means for receiving a secondary currency purchase order, the secondary currency purchase order indicative of an outright option sale;

a principal market maker futures computer coupled to the means for receiving the primary currency purchase order, the principal market maker futures computer operative to execute primary currency purchase orders and maintain a currency futures bid and offer market;

a principal market maker options computer coupled to the means for receiving the secondary currency purchase order, the principal market maker options computer operative to execute secondary currency purchase orders and maintain a currency options bid and offer market; and

a bi-directional communications link coupled between the futures and options computers, the bi-directional communications link to facilitate intermarket trading to manage risk taken in a position resulting from a trade in either market.

24. An electronic bank and institutional market for trading currencies, comprising:

a communications interface operative to transmit currency bids and offers from at least one financial institution; and

a principal market maker computer coupled to the communications interface, the principal market maker computer operative to receive the currency bids and offers and execute trades to maintain a market for currency trades.

25. The electronic bank and institutional market defined in claim 24 further including a clearing facility coupled to the principal market maker computer, the clearing system operative to confirm and settle trades executed by the principal market maker computer.

26. The electronic bank and institutional market defined in claim 24, further comprising a principal market maker options computer.

27. The electronic bank and institutional market defined in claim 24, further comprising a bi-directional communications link coupled between the options computer and main computer.

28. The electronic bank and institutional market defined in claim 24, wherein the link comprises a modem.

29. The electronic bank and institutional market defined in claim 24, wherein the link comprises a telephone.

30. The electronic bank and institutional market defined in claim 24, wherein the link comprises a voice activation computer.

31. The electronic bank and institutional market defined in claim 24, wherein the link comprises a touch screen display.

32. The electronic bank and institutional market defined in claim 24, wherein the link comprises a keyboard.

33. A system for trading comprising:

an electronic brokerage and trading network having at least one computer, display terminal and input, the electronic brokerage and trading network coupled to receive and transmit bids and offers; and

a principal market maker computer coupled to the electronic brokerage and trading network, the principal market maker computer operative to receive and transmit the bids and offers and execute trades by maintaining a constant bid and offer market.

34. A method of trading currencies, comprising the steps of:

receiving and transiting bids and offers for publicly traded currencies;

storing the received bids and offers in a memory;

identifying matching bids and offers;

executing the matching bids and offers;

identifying unmatched bids and offers; and

providing a complementary trade to maintain a market for such currencies.

35. The method of claim 34 further comprising the step of confirming and

settling said matching bids and offers.

36. The method of claim 34 further comprising the step of confirming and settling said trade.

37. A method of maintaining a market for publicly traded currencies, comprising the steps of:

receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

receiving a secondary currency purchase order, the secondary currency purchase order indicative of a currency option hedge;

matching and executing the primary currency purchase order to maintain a currency futures market;

matching and executing the secondary currency purchase order to maintain a currency options market; and

providing intermarket futures and options trading to manage risk taken in a position resulting from a trade in either market.

38. The method of claim 37 further comprising the step of providing a communications link to rolling spot future trade systems.

39. The method of claim 37 further comprising the step of providing a communications link to currency futures trade systems.

40. The method of claim 37 further comprising the step of providing a communications link to allow vertical, horizontal and combination spread options trading.

41. A method of maintaining a market for publicly traded currencies, comprising the steps of:

receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

receiving a secondary currency purchase order, the secondary currency purchase order indicative of an outright option purchase;

matching and executing the primary currency purchase order to maintain

a currency futures market;

matching and executing the secondary currency purchase order to maintain a currency options market; and

providing intermarket futures and options trading to manage risk taken in a position resulting from a trade in either market.

42. The method of claim 41 further comprising the step of providing a communications link to rolling spot future trade systems.

43. The method of claim 41 further comprising the step of providing a communications link to currency futures trade systems.

44. The method of claim 41 further comprising the step of providing a communications link to allow vertical, horizontal and combination spread options trading.

45. A method of maintaining a market for publicly traded currencies, comprising the steps of:

receiving a primary currency purchase order, the primary currency purchase order indicative of whether a currency is to be bought or sold;

receiving a secondary currency purchase order, the secondary currency purchase order indicative of an outright option sale;

matching and executing the primary currency purchase order to maintain a currency futures market;

matching and executing the secondary currency purchase order to maintain a currency options market; and

providing intermarket futures and options trading to manage risk taken in a position resulting from a trade in either market.

46. The method of claim 45 further comprising the step of providing a communications link to rolling spot future trade systems.

47. The method of claim 45 further comprising the step of providing a communications link to currency futures trade systems.

48. The method of claim 45 further comprising the step of providing a communications link to allow vertical, horizontal and combination spread options trading.

49. A method of trading currencies, comprising the steps of:
receiving currency bids and offers from at least one financial institution;
storing the currency bids and offers in a memory;
matching the stored bids and offers to maintain a market for the currency traded; and
executing the matched trades.

50. The method of claim 49 further comprising the step of confirming and settling said matched trades.

51. A method of trading comprising the steps of:
receiving and transmitting bids and offers;
storing the received bids and offers in a memory;
identifying matching bids and offers;
executing the matching bids and offers;
identifying unmatched bids and offers; and
providing a complementary trade to maintain a market.

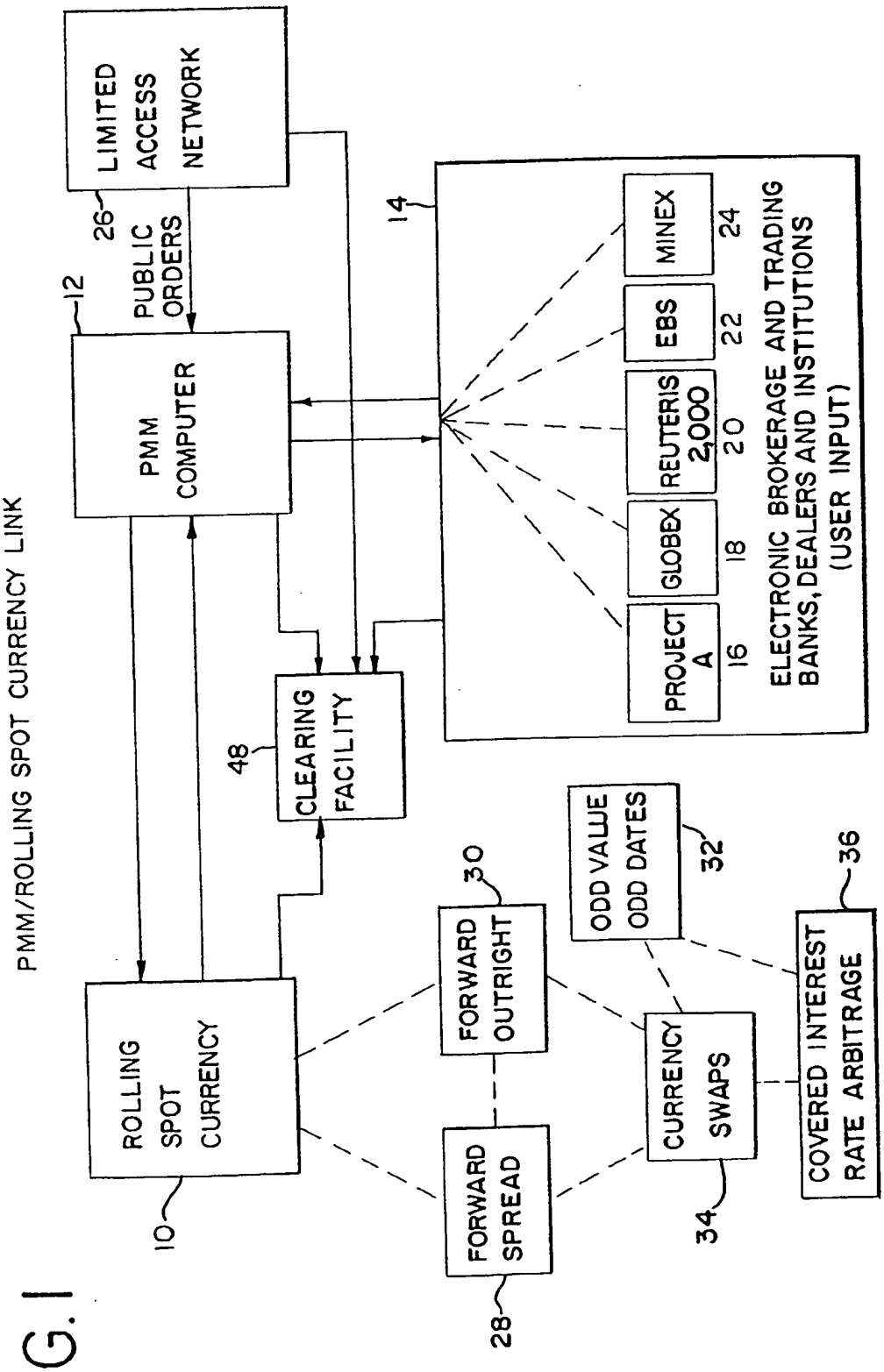
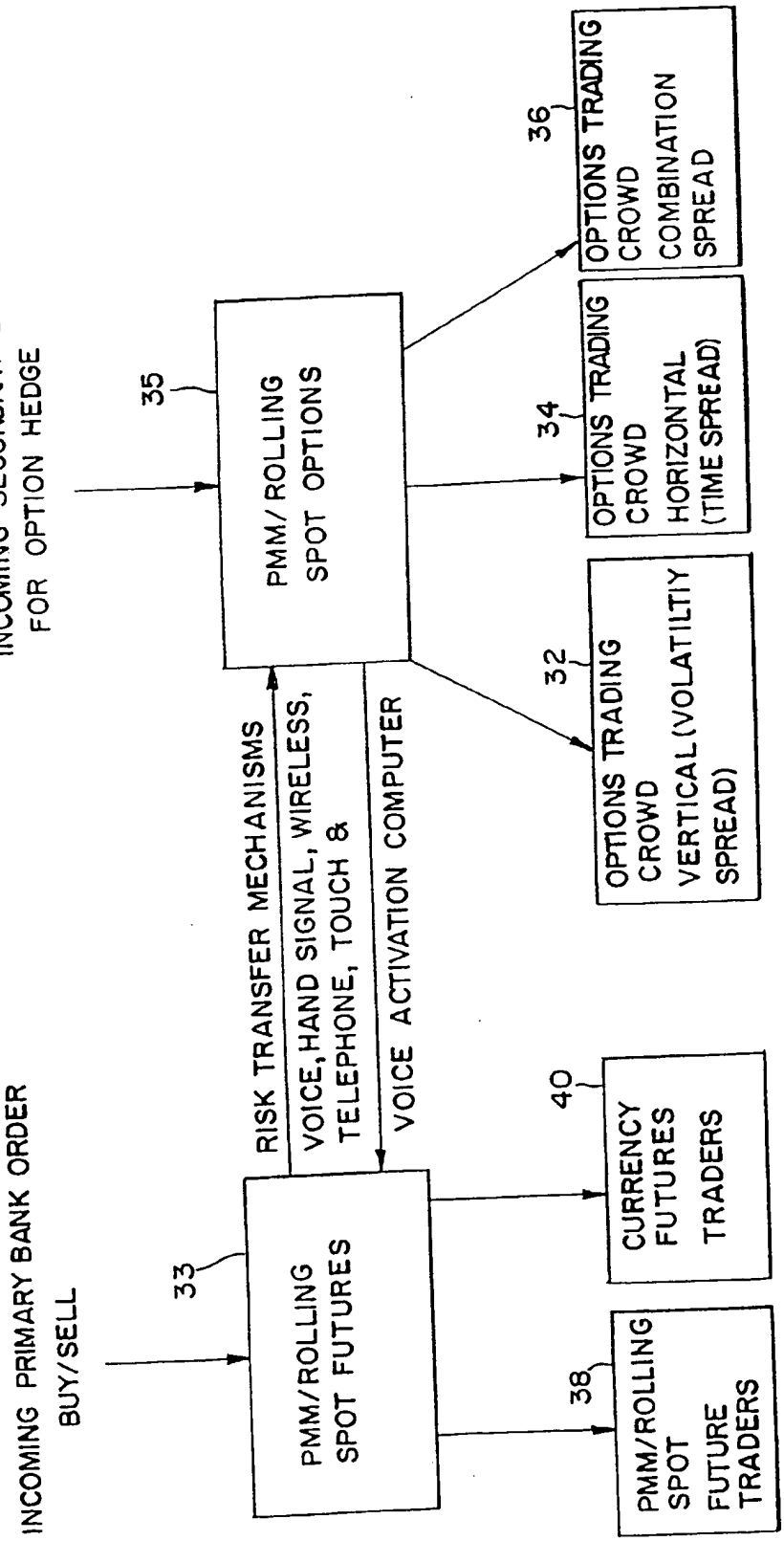

PMM/ROLLING SPOT CURRENCY LINK
LIMITED ACCESS NETWORK
26
PUBLIC ORDERS
12
PMM COMPUTER
14
ELECTRONIC BROKERAGE AND TRADING BANKS, DEALERS AND INSTITUTIONS (USER INPUT)
PROJECT A
16
GLOBEX
18
REUTERIS 2,000
20
EBS
22
MINEX
24
48
CLEARING FACILITY
ROLLING SPOT CURRENCY
10
FORWARD OUTRIGHT
30
FORWARD SPREAD
28
ODD VALUE ODD DATES
32
CURRENCY SWAPS
34
COVERED INTEREST RATE ARBITRAGE
36

FIG. 1

FIG. 2

RISK TRANSFER UNDER THE PMM/ROLLING SPOT LINK



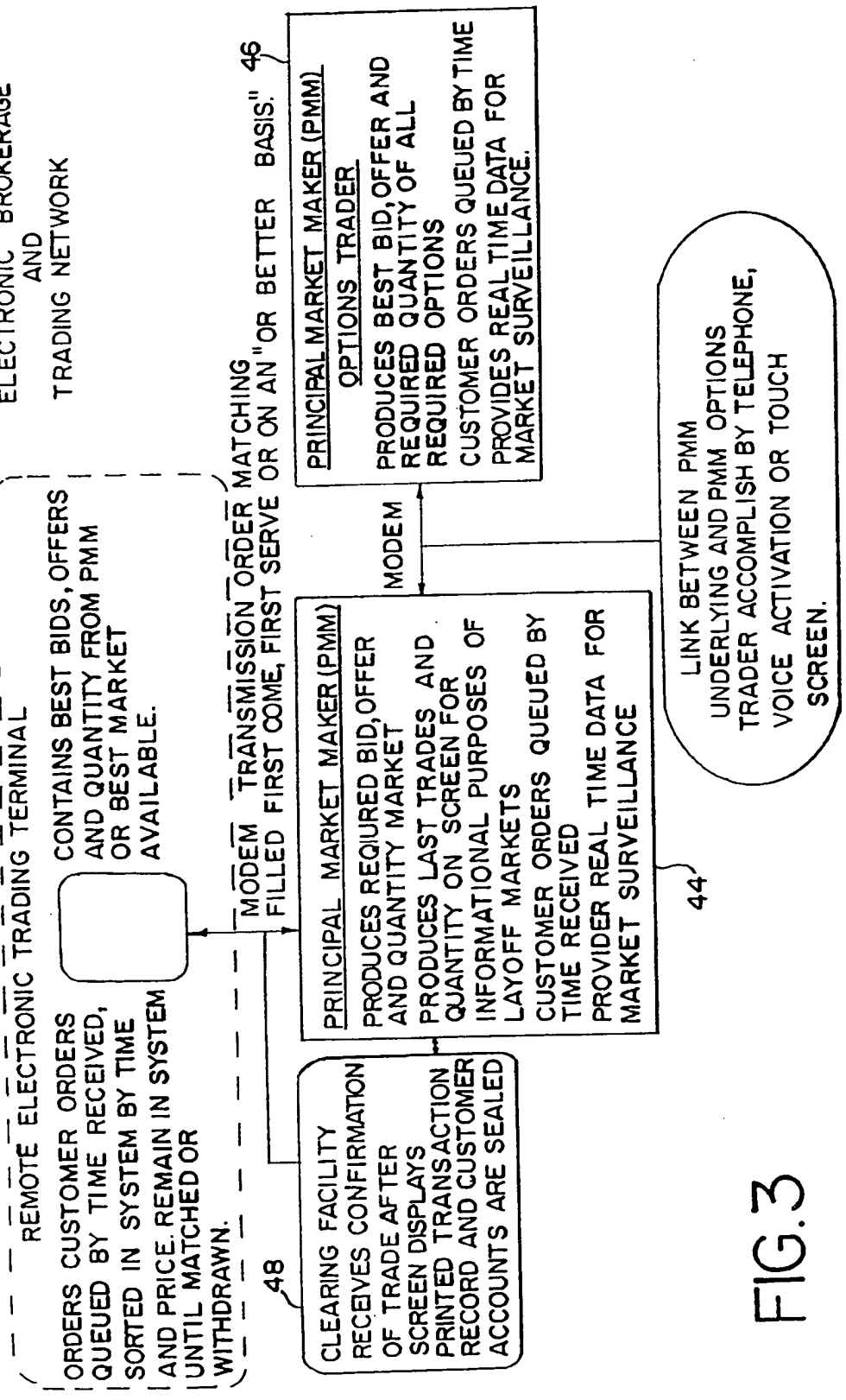

FINANCIAL INSTITUTIONS
42
REMOTE ELECTRONIC TRADING TERMINAL
ORDERS CUSTOMER ORDERS QUEUED BY TIME RECEIVED, SORTED IN SYSTEM BY TIME AND PRICE. REMAIN IN SYSTEM UNTIL MATCHED OR WITHDRAWN.
CONTAINS BEST BIDS, OFFERS AND QUANTITY FROM PMM OR BEST MARKET AVAILABLE.
MODEM TRANSMISSION ORDER MATCHING FILLED FIRST COME, FIRST SERVE OR ON AN "OR BETTER BASIS"
ELECTRONIC BROKERAGE AND TRADING NETWORK
PRINCIPAL MARKET MAKER (PMM)
OPTIONS TRADER
PRODUCES BEST BID, OFFER AND REQUIRED QUANTITY OF ALL REQUIRED OPTIONS
CUSTOMER ORDERS QUEUED BY TIME
PROVIDES REAL TIME DATA FOR MARKET SURVEILLANCE.
46
MODEM
PRINCIPAL MARKET MAKER (PMM)
PRODUCES REQUIRED BID, OFFER AND QUANTITY MARKET
PRODUCES LAST TRADES AND QUANTITY ON SCREEN FOR INFORMATIONAL PURPOSES OF LAYOFF MARKETS
CUSTOMER ORDERS QUEUED BY TIME RECEIVED
PROVIDER REAL TIME DATA FOR MARKET SURVEILLANCE
44
LINK BETWEEN PMM UNDERLYING AND PMM OPTIONS TRADER ACCOMPLISH BY TELEPHONE, VOICE ACTIVATION OR TOUCH SCREEN.
48
CLEARING FACILITY RECEIVES CONFIRMATION OF TRADE AFTER SCREEN DISPLAYS PRINTED TRANSACTION RECORD AND CUSTOMER ACCOUNTS ARE SEALED

FIG.3

FIG. 4

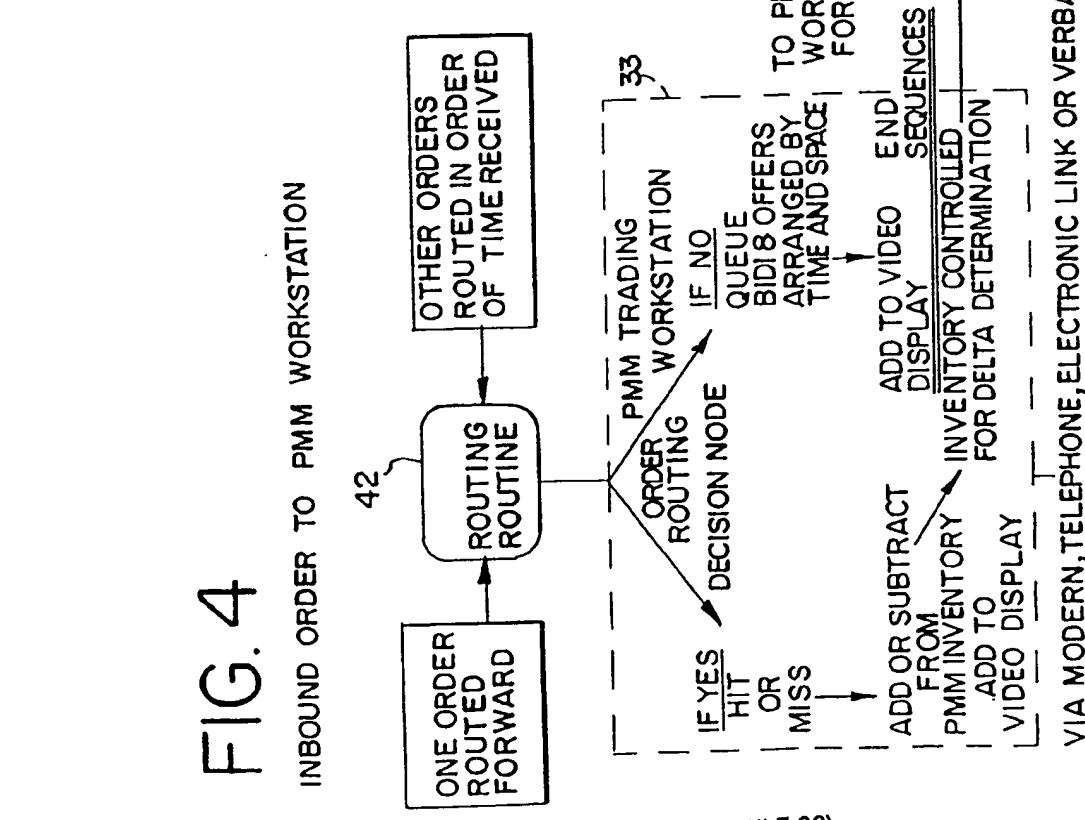

INBOUND ORDER TO PMM WORKSTATION
ONE ORDER ROUTED FORWARD
ROUTING ROUTINE
42
OTHER ORDERS ROUTED IN ORDER OF TIME RECEIVED
ORDER ROUTING DECISION NODE
PMM TRADING WORKSTATION
33
IF NO QUEUE BID/OFFERS ARRANGED BY TIME AND SPACE
TO PMM OPTIONS WORKSTATION FOR HEDGING
IF YES HIT OR MISS
ADD TO VIDEO DISPLAY
END SEQUENCES
ADD OR SUBTRACT FROM PMM INVENTORY
INVENTORY CONTROLLED FOR DELTA DETERMINATION
ADD TO VIDEO DISPLAY
VIA MODERN, TELEPHONE, ELECTRONIC LINK OR VERBAL
FUTURES AND INNERBANK MARKET

FIG. 5

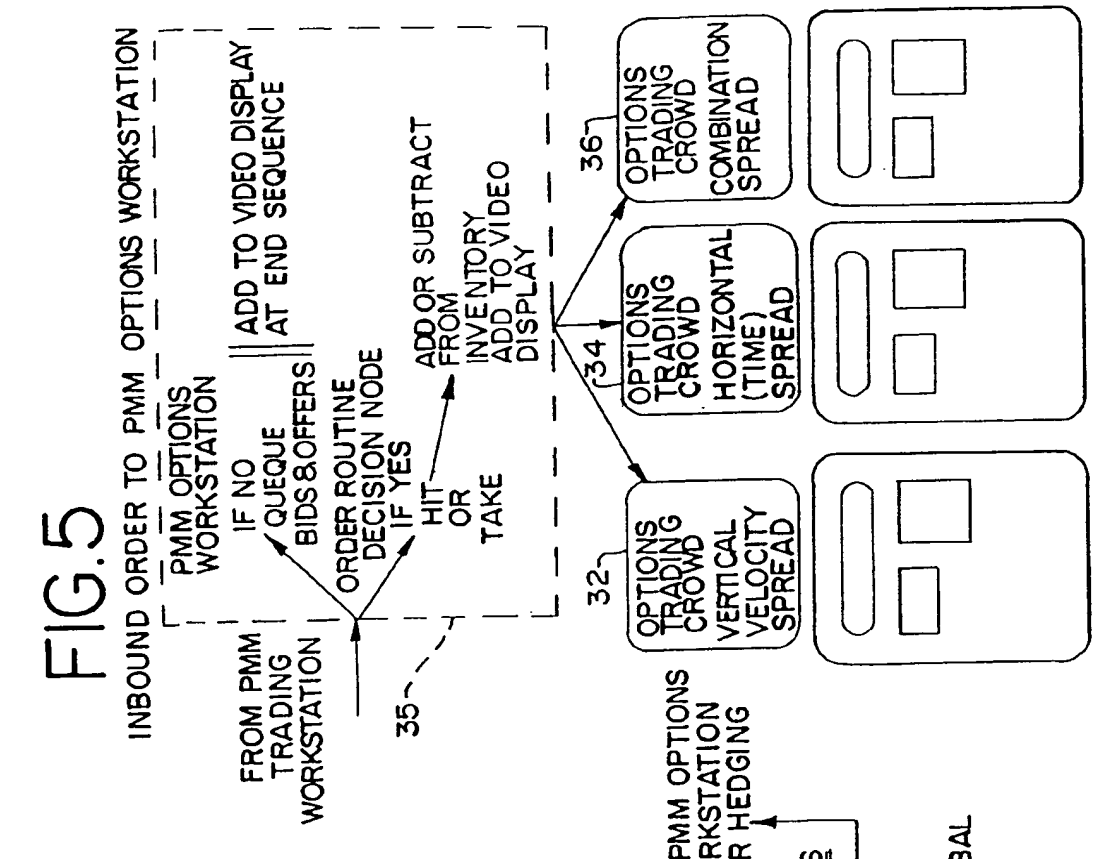

INBOUND ORDER TO PMM OPTIONS WORKSTATION
PMM OPTIONS WORKSTATION
FROM PMM TRADING WORKSTATION
35
IF NO QUEQUE BIDS & OFFERS
ORDER ROUTINE DECISION NODE
IF YES HIT OR TAKE
ADD OR SUBTRACT FROM INVENTORY ADD TO VIDEO DISPLAY
ADD TO VIDEO DISPLAY AT END SEQUENCE
32
OPTIONS TRADING CROWD VERTICAL VELOCITY SPREAD
34
OPTIONS TRADING CROWD HORIZONTAL (TIME) SPREAD
36
OPTIONS TRADING CROWD COMBINATION SPREAD

FIG. 6

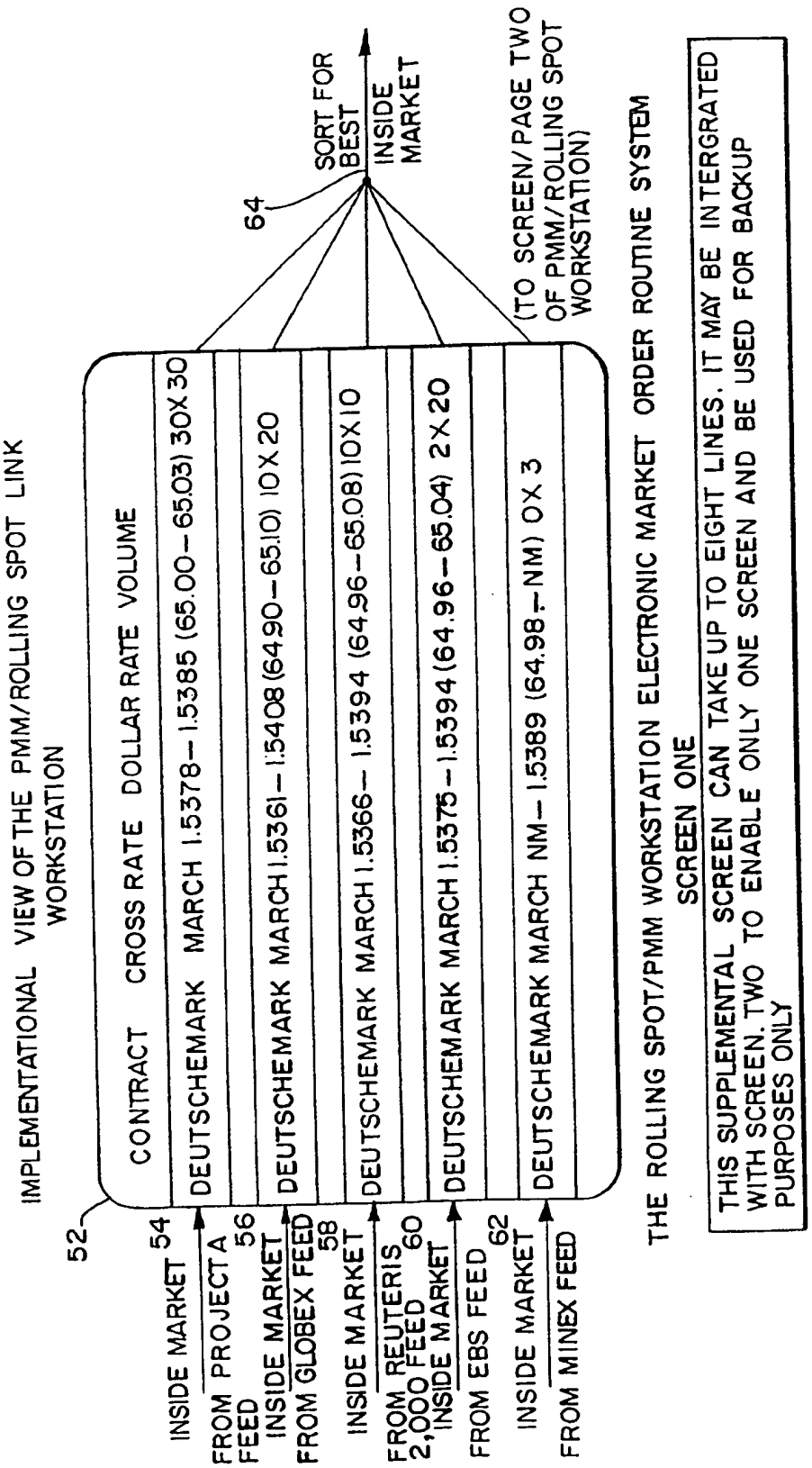

IMPLEMENTATIONAL VIEW OF THE PMM/ROLLING SPOT LINK WORKSTATION
52
CONTRACT CROSS RATE DOLLAR RATE VOLUME
DEUTSCHEMARK MARCH 1.5378–1.5385 (65.00–65.03) 30X30
DEUTSCHEMARK MARCH 1.5361–1.5408 (64.90–65.10) 10X20
DEUTSCHEMARK MARCH 1.5366–1.5394 (64.96–65.08) 10X10
DEUTSCHEMARK MARCH 1.5375–1.5394 (64.96–65.04) 2X20
DEUTSCHEMARK MARCH NM–1.5389 (64.98–NM) 0X3
INSIDE MARKET 54
FROM PROJECTA FEED 56
INSIDE MARKET FROM GLOBEX FEED 58
INSIDE MARKET FROM REUTERIS 2,000 FEED 60
INSIDE MARKET FROM EBS FEED 62
INSIDE MARKET FROM MINEX FEED
64
SORT FOR BEST INSIDE MARKET
(TO SCREEN/PAGE TWO OF PMM/ROLLING SPOT WORKSTATION)
THE ROLLING SPOT/PMM WORKSTATION ELECTRONIC MARKET ORDER ROUTINE SYSTEM
SCREEN ONE
THIS SUPPLEMENTAL SCREEN CAN TAKE UP TO EIGHT LINES. IT MAY BE INTERGRATED WITH SCREEN. TWO TO ENABLE ONLY ONE SCREEN AND BE USED FOR BACKUP PURPOSES ONLY

FIG. 7

IMPLEMENTATIONAL VIEW OF
PMM/ROLLING SPOT LINK WORKSTATION AUTOMATED
BROKERAGE SCREEN

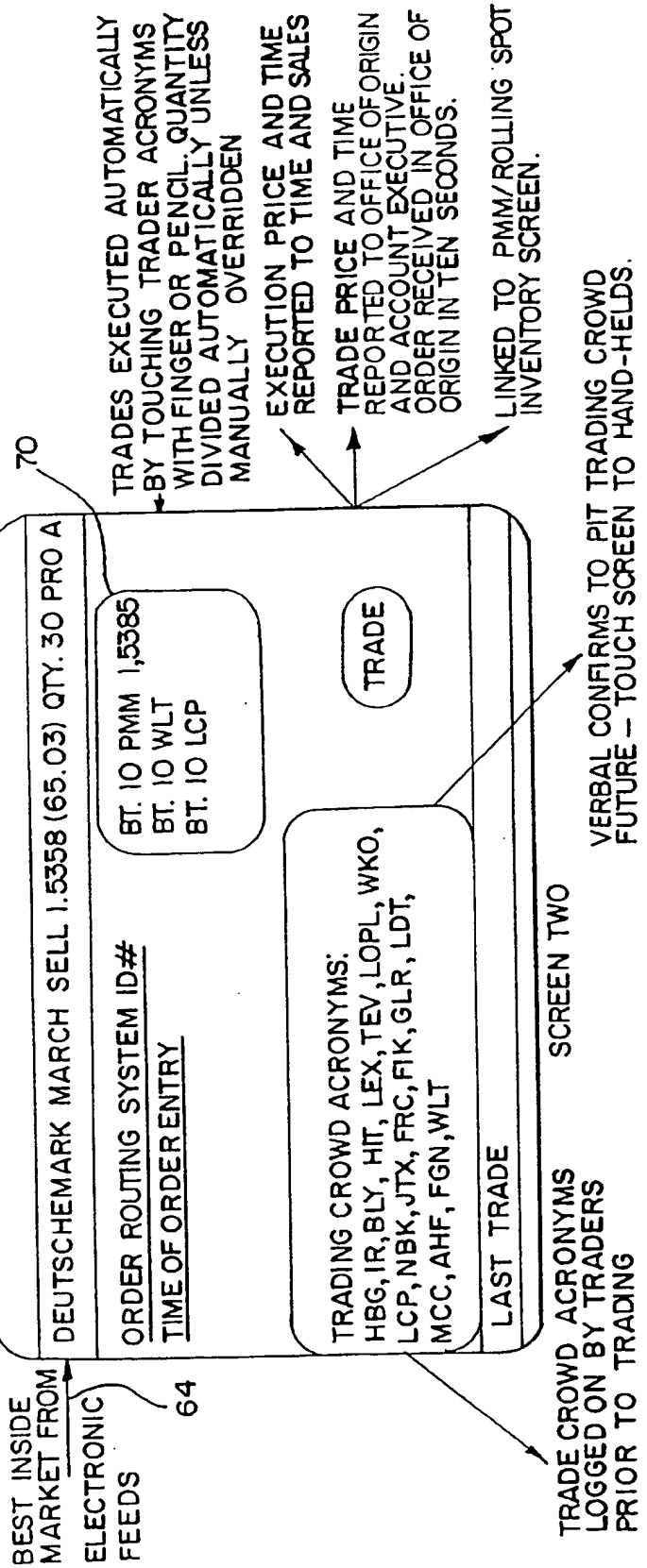


FIG. 8

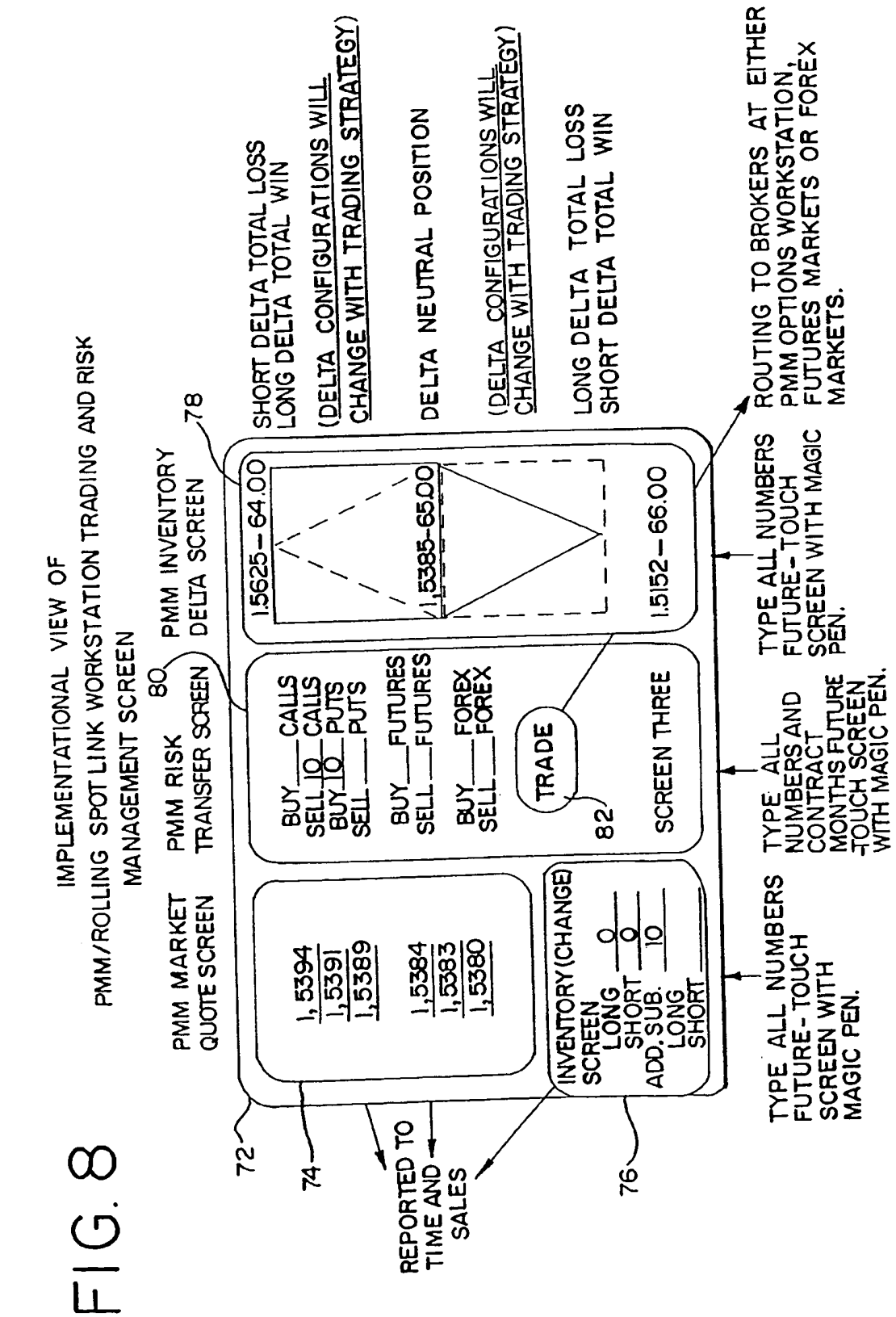

IMPLEMENTATIONAL VIEW OF
PMM/ROLLING SPOT LINK WORKSTATION TRADING AND RISK
MANAGEMENT SCREEN
PMM MARKET QUOTE SCREEN
PMM RISK TRANSFER SCREEN
80
PMM INVENTORY DELTA SCREEN
78
72
74
76
1,5394
1,5391
1,5389
1,5384
1,5383
1,5380
BUY CALLS
SELL 10 CALLS
BUY 10 PUTS
SELL PUTS
BUY FUTURES
SELL FUTURES
BUY FOREX
SELL FOREX
TRADE
82
SCREEN THREE
INVENTORY (CHANGE)
SCREEN
LONG 0
SHORT 0
ADD. SUB. 10
LONG
SHORT
1.5625-64.00
1.5385-65.00
1.5152-66.00
SHORT DELTA TOTAL LOSS
LONG DELTA TOTAL WIN
(DELTA CONFIGURATIONS WILL
CHANGE WITH TRADING STRATEGY)
DELTA NEUTRAL POSITION
(DELTA CONFIGURATIONS WILL
CHANGE WITH TRADING STRATEGY)
LONG DELTA TOTAL LOSS
SHORT DELTA TOTAL WIN
ROUTING TO BROKERS AT EITHER PMM OPTIONS WORKSTATION, FUTURES MARKETS OR FOREX MARKETS.
TYPE ALL NUMBERS FUTURE-TOUCH SCREEN WITH MAGIC PEN.
TYPE ALL NUMBERS AND CONTRACT MONTHS FUTURE TOUCH SCREEN WITH MAGIC PEN.
TYPE ALL NUMBERS FUTURE-TOUCH SCREEN WITH MAGIC PEN.
REPORTED TO TIME AND SALES

FIG. 9

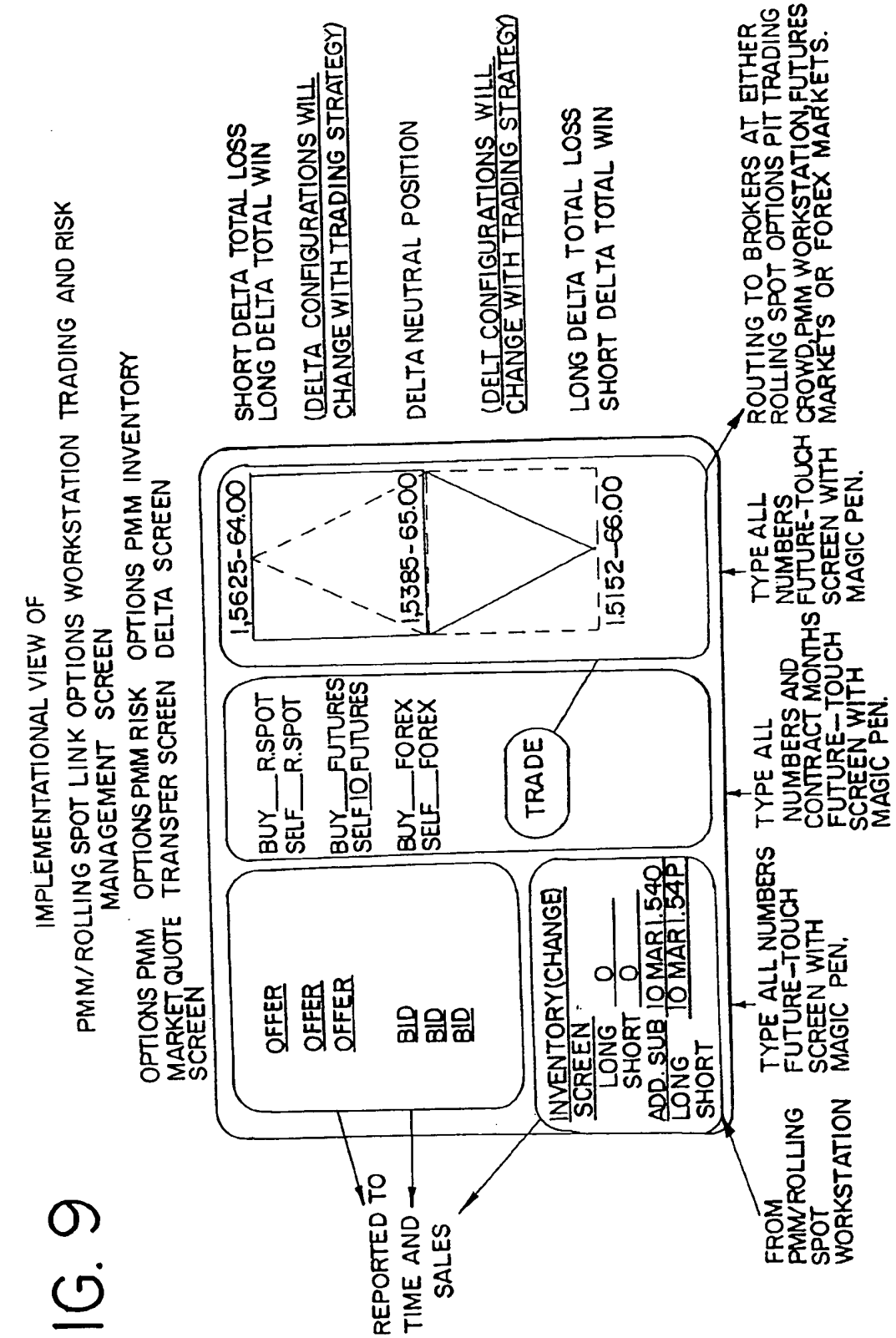
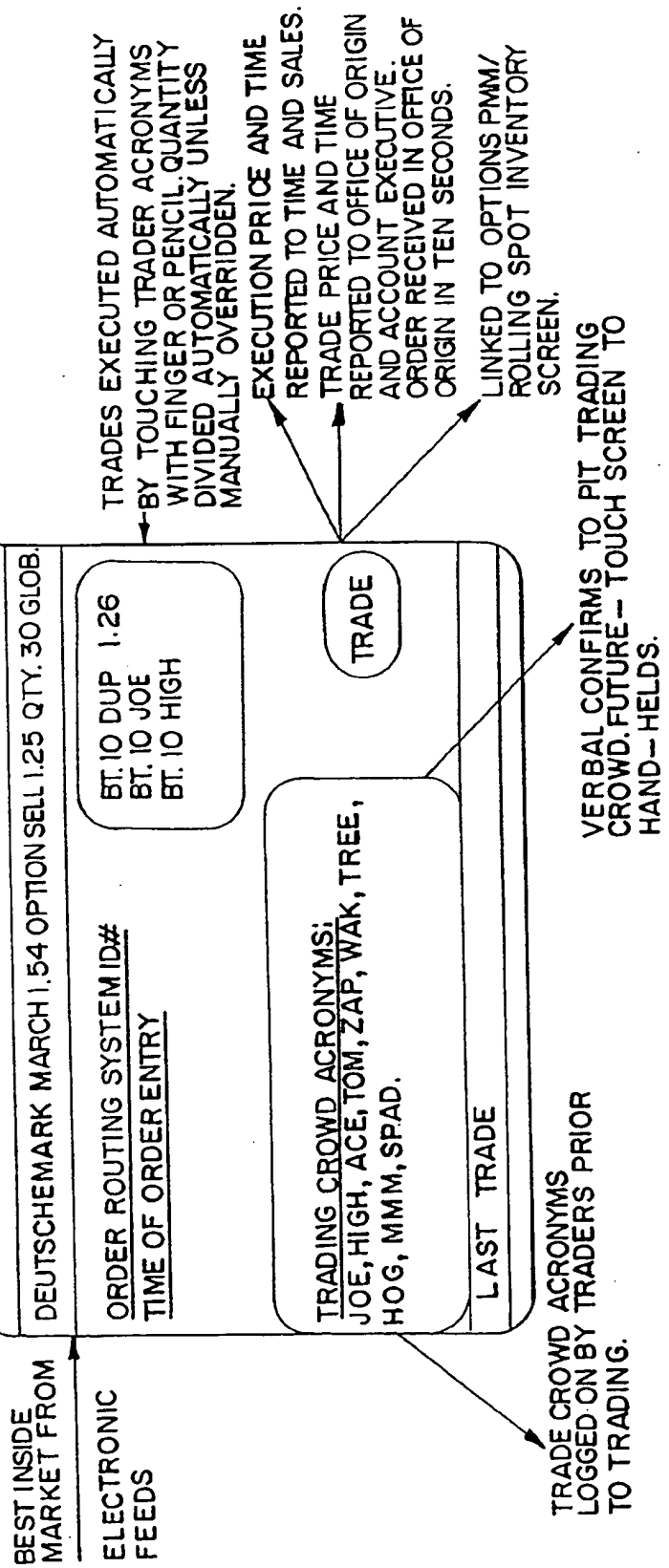

IMPLEMENTATIONAL VIEW OF
PMM/ROLLING SPOT LINK OPTIONS WORKSTATION TRADING AND RISK MANAGEMENT SCREEN
OPTIONS PMM MARKET QUOTE SCREEN
OPTIONS PMM RISK TRANSFER SCREEN
OPTIONS PMM INVENTORY DELTA SCREEN
OFFER
OFFER
OFFER
BID
BID
BID
INVENTORY(CHANGE)
SCREEN
LONG 0
SHORT 0
ADD. SUB 10 MAR 1.540
LONG 10 MAR 1.54P
SHORT
BUY R.SPOT
SELF R.SPOT
BUY FUTURES
SELF 10 FUTURES
BUY FOREX
SELF FOREX
TRADE
1.5625-64.00
1.5385-65.00
1.5152-66.00
SHORT DELTA TOTAL LOSS
LONG DELTA TOTAL WIN
(DELTA CONFIGURATIONS WILL CHANGE WITH TRADING STRATEGY)
DELTA NEUTRAL POSITION
(DELT CONFIGURATIONS WILL CHANGE WITH TRADING STRATEGY)
LONG DELTA TOTAL LOSS
SHORT DELTA TOTAL WIN
REPORTED TO TIME AND SALES
FROM PMM/ROLLING SPOT WORKSTATION
TYPE ALL NUMBERS FUTURE-TOUCH SCREEN WITH MAGIC PEN.
TYPE ALL NUMBERS AND CONTRACT MONTHS FUTURE-TOUCH SCREEN WITH MAGIC PEN.
TYPE ALL NUMBERS FUTURE-TOUCH SCREEN WITH MAGIC PEN.
ROUTING TO BROKERS AT EITHER ROLLING SPOT OPTIONS PIT TRADING CROWD, PMM WORKSTATION, FUTURES MARKETS OR FOREX MARKETS.

FIG. 10

IMPLEMENTATIONAL VIEW OF
PMM/ROLLING SPOT OPTIONS LINK WORKSTATION AUTOMATED
BROKERAGE SCREEN



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/20287

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 15/20
US CL :705/37

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/37, 35; 235/379, 380

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, DIALOG,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,677,552 (SIBLEY, JR.) 30 June 1987, Figures 1-10.	1-7, 13, 24-25, 33, 49-51
X	US, A, 5,168,446 (WISEMAN) 01 December 1992, Figures 1-20B, cols. 2, 6-8, 13-14.	14-51
Y	US A 5,297,031 (GUTTERMAN et al.) 22 March 1994, Figs. 1a-3a.	1-7, 13-51.
X --- Y	US, A, 5,077,665 (SILVERMAN et al.) 31 December 1991, see Figs. 1-18, col. 1.	1-7, 10, 13 --- 14-51
X --- Y	US, A, 5,297,032 (TROJAN et al.) 22 March 1994, see Figs. 1-2.	1-7, 13, 51 --- 14-50

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
11 FEBRUARY 1998

Date of mailing of the international search report
15 APR 1998

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
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Washington, D.C. 20231
Facsimile No. (703) 305-3230

Authorized officer
ELIZABETH STANLEY
Telephone No. (703) 308-8786

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/20287

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,305,200 (HARTHEIMER et al.) 19 April 1994, see Figs. 1-8.	1-7, 13-51
X --- Y	US, A, 4,903,201 (WAGNER) 20 February 1990, see Figs. 1-14.	1-7, 13, 24, 25, 28, 29, 32, 33-36, 49, 51 ------- 14-23, 37-48
X --- Y	US, A, 4,980,826 (WAGNER) 25 December 1990, see Figs. 1-25.	1-7, 13, 24, 25, 28-36, 49, 51 ------ 14--23, 37-48

4

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 KK  KK  OO OO   SS  SS    AAAA    WW    WW   AAAA
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 KK KK   OO   OO     SSS  AAAAAA   WWWWWWWW AAAAAA
 KK  KK  OO OO   SS  SS   AA  AA   WWW WWW AA  AA
KKK  KK    OOO     SSSS    AA  AA   WW    WW AA  AA
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777777  777777
77  77  77  77
    77      77
   77      77
  77      77
  77      77
  77      77
```

1/9/03

PROPOSED RESPONSE, PLEASE DO NOT ENTER

Docket No. 4381-4000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Toyokazu Haga, et al.

Group Art Unit: 1614

Serial No.: 10/142,339

Examiner: Robert Shiao

Filed: May 08, 2002

For: PROCESS FOR PRODUCING STEREOISOMER OF PYRROLIDINE DERIVATIVE

AMENDMENT

Commissioner for Patents
Washington, DC 20231

Sir:

This amendment is being filed in response to the Office Action dated October 22, 2002. Entry of this amendment and favorable reconsideration of the above-identified application in view of the following amendment and remarks are respectfully requested.

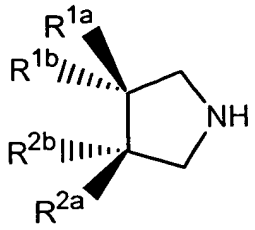
Please amend the above-identified application as follows:

IN THE CLAIMS

Please cancel claims 6 and 16.

Please amend claims 1 and 11 as follows:

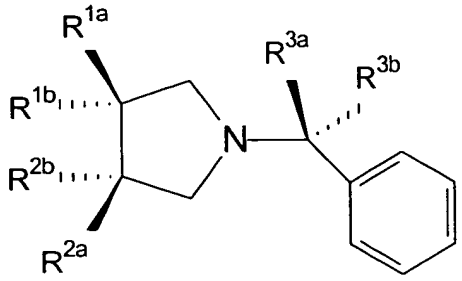
1. (Amended) A process for producing optically active 3-hydroxy-4-methoxypyrrolidine represented by the following formula (1-7):



(1-7)

wherein R^{1a} and R^{1b} are different from each other, and each of R^{1a} and R^{1b} represents a hydrogen atom or a hydroxyl group, and R^{2a} and R^{2b} are different from each other, and each of R^{2a} and R^{2b} represents a hydrogen atom or a methoxy group[]], a salt thereof or a hydrate thereof, comprising the steps of:

mixing[subjecting] a pyrrolidine derivative selected from the group consisting of pyrrolidine derivative represented by the following formula (1-4) and a mixture thereof:



(1-4)

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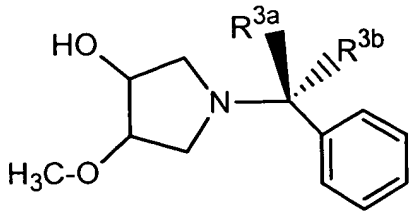
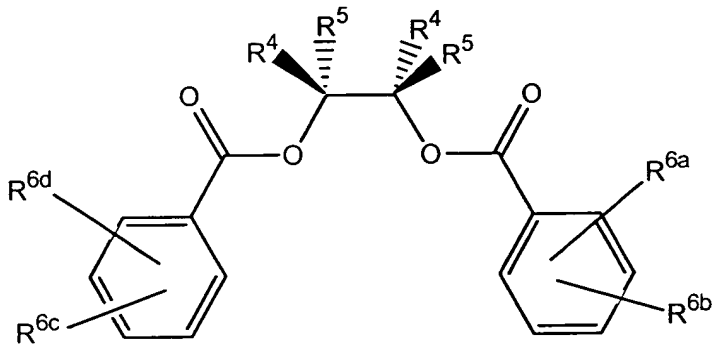
wherein R^{1a}, R^{1b}, R^{2a} and R^{2b} have the same definition as mentioned above, and each of R^{3a} and R^{3b} represents a hydrogen atom or a methyl group.[represented by the following formula (1-4):



(1-4)

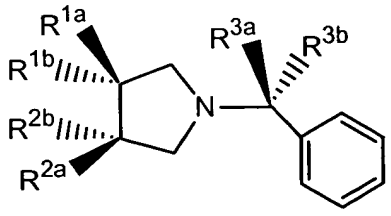
wherein R^{3a} and R^{3b} are different from each other, and each of R^{3a} and R^{3b}

represents a hydrogen atom or a methyl group], with[to optical division purification by using] an optically active dibenzoyltartaric acid derivative represented by the following formula (1-5):



(1-5)

wherein R^{6a}, R^{6b}, R^{6c} and R^{6d} each independently represents a hydrogen atom, a halogen atom, a C1-6 alkoxy group or a C1-6 alkyl group, and R^4 and R^5 are different from each other, and each of R^4 and R^5 represents a hydrogen atom or a carboxyl group to obtain a mixture of salts of the pyrrolidine derivative and the optically active dibenzoyltartaric acid derivative, followed by crystallization to obtain a salt from the mixture of salts, removal of the optically active dibenzoyltartaric acid derivative from the salt, and extraction with an organic solvent, to yield a compound (1-6) represented by the following formula (1-6):



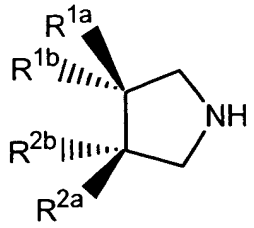
(1-6)

wherein R^{1a}, R^{1b}, R^{2a}, R^{2b}, R^{3a} and R^{3b} have the same definition as mentioned above; and

removing the 1-phenylethyl group of the compound (1-6), to yield the optically active 3-hydroxy-4-methoxypyrrolidine[, the salt thereof or the hydrate

thereof].

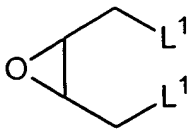
11. (Amended) A process for producing optically active 3-hydroxy-4-methoxypyrrolidine represented by the following formula (1-7):



(1-7),

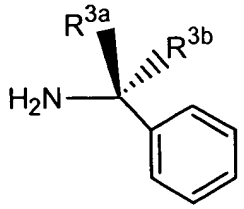
wherein R^{1a} and R^{1b} are different from each other, and each of R^{1a} and R^{1b} represents a hydrogen atom or a hydroxyl group, and R^{2a} and R^{2b} are different from each other, and each of R^{2a} and R^{2b} represents a hydrogen atom or a methoxy group, a salt thereof or a hydrate thereof, comprising the steps of:

reacting an oxysilane derivative represented by the following formula (1-1):



(1-1),

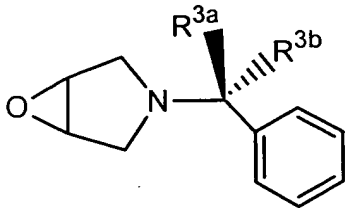
wherein L^1 represents a halogen atom, a methanesulfonyloxy group, or a p-toluenesulfonyloxy group, with an amine derivative represented by the following formula (1-2)



(1-2),

wherein R^{3a} and R^{3b} are different from each other, and each of R^{3a} and R^{3b} represents a hydrogen atom or a methyl group, to yield a pyrrolidine derivative (1-3)

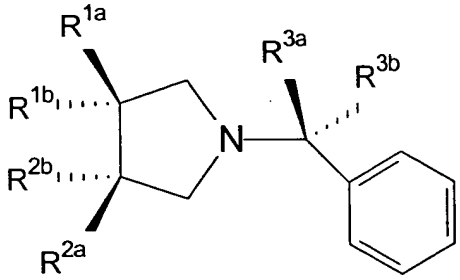
represented by the following formula (1-3):



(1-3)

wherein R^{3a} and R^{3b} have the same definition as mentioned above;

reacting the derivative (1-3) with a methoxylating agent, to yield a mixture of pyrrolidine derivatives represented by the following formula (1-4):



(1-4)

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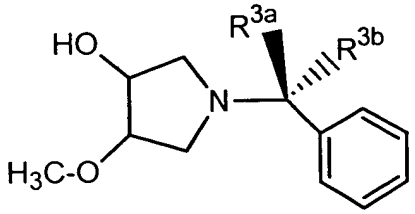
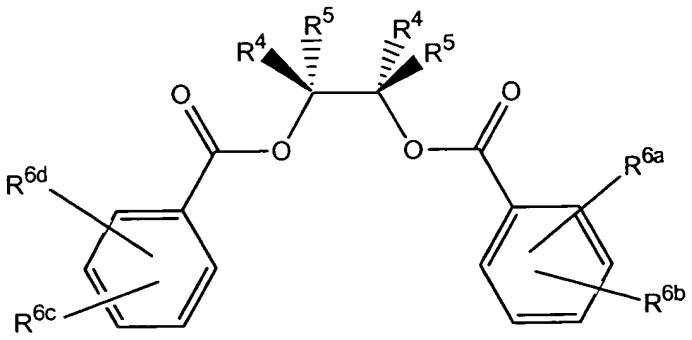
wherein R^{1a}, R^{1b}, R^{2a}, R^{2b}, R^{3a} and R^{3b} have the same definition as mentioned above,[a pyrrolidine derivative (1-4):



(1-4)

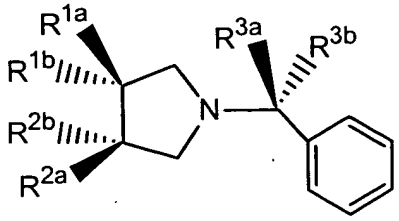
wherein R^{3a} and R^{3b} have the same definition as mentioned above];

mixing[subjecting] the [derivative] mixture[(1-4)] with[to optical division purification by using] an optically active dibenzoyltartaric acid derivative represented by the following formula (1-5):



(1-5)

wherein R^{6a}, R^{6b}, R^{6c} and R^{6d} each independently represents a hydrogen atom, a halogen atom, a C1-6 alkoxy group or a C1-6 alkyl group, and R^4 and R^5 are different from each other, and each of R^4 and R^5 represents a hydrogen atom or a carboxyl group to obtain a mixture of salts of the pyrrolidine derivative and the optically active dibenzoyltartaric acid derivative, followed by crystallization to obtain a salt from the mixture of salts, removal of the optically active dibenzoyltartaric acid derivative from the salt, and extraction with an organic solvent, to yield a compound (1-6) represented by the following formula (1-6):



(1-6)

wherein R^{1a}, R^{1b}, R^{2a}, R^{2b}, R^{3a} and R^{3b} have the same definition as mentioned above; and

removing the 1-phenylethyl group of the compound (1-6), to yield optically active the 3-hydroxy-4-methoxypyrrolidine, the salt thereof or the hydrate thereof.

REMARKS

Claim Status

Claims 1-20 are pending. Claims 1, 6 and 11 were rejected as indefinite and ambiguous, Claim 2-10 and 12-20 were objected but indicated as allowable if the rejection of Claims 1 and 11 are resolved.

Claim Rejection

Claims 1 and 11

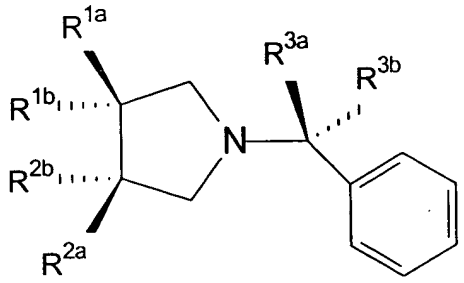
Claims 1 and 11 are rejected under 35 U.S.C. §112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which applicant regards as the claimed invention. The Examiner stated that the term "optical division purification" was indefinite and ambiguous, which failed to particularly point out which methods are involved. The Examiner requires the claims to clearly describe the chemical methods used in the processes. Claims 1 and 11 have been amended to recite the following methods used in the processes.

> **mixing** a pyrrolidine derivative ... with an optically active dibenzoyltartaric acid derivative ... to obtain a mixture of salts of the pyrrolidine derivative and the optically active dibenzoyltartaric acid derivative, followed by **crystalization** to obtain a salt from the mixture of salts, **removal** of the optically active dibenzoyltartaric acid derivative from the salt, and **extraction** with an organic solvent.

This amendment is clearly supported by the original description in the specification, for example page 12, line 21 – page 13, line 19 as well as Examples 6, 8 and 9 ("mixing" and "crystallization" steps), and Examples 7 and 10 ("removal" and "extraction" steps).

In order to further prosecute this application, Applicants have amended Claims 1 and 11 as follows:

Claim 1. ... a pyrrolidine derivative represented by the following formula (1-4) and a mixture thereof:

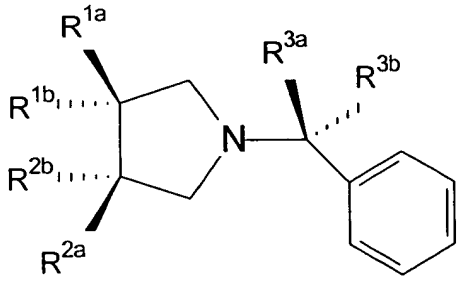


(1-4)

.....

Claim 11. ....

a mixture of pyrrolidine derivatives represented by the following formula (1-4):



(1-4)

.... This amendment has been made to more clarify the claimed inventions. This amendment is clearly supported by the original description of the specification, for example in the original claim 6 as well as at page 7, lines 7-11 in the specification where it is clearly describes that "Compounds of the present invention may be isomers thereof such as all geometrical isomers generated from the structure of the compounds, optical isomers based on an asymmetric carbon thereof, stereoisomers and enantiomers, and **mixtures of some of the isomers**. Accordingly, the compounds of the present invention are not limited to those defined by the structural formula thereof, and may be any one of the isomers, **or a mixture of some of the isomers**."(emphasis added)

CONCLUSION

Based on the foregoing amendments and remarks, Applicants respectfully request reconsideration and allowance of this application.

Attached hereto is a marked-up version of the changes made to the claims 1 and 11 by this amendment.

The Commissioner is hereby authorized to charge any additional fees which may be required for the timely consideration of this amendment under 37 C.F.R. §§ 1.16 and 1.17, or credit any overpayment to Deposit Account No. 13-4500, Order No. 4381-4000.

Respectfully submitted,
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Dated: _____

By: _____
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